Computer Hardware:
- Fast: CPU & cache, PCIe bus, Memory/RAM -> Northbridge
- Slow: peripherals (keyboard & mouse), hard drive/disk -> Southbridge

CPU & cache

PCle Bus fast Northbridge fast Memory
(for graphics card)
slow

Peripherals slow Southbridge slow Hard drive/disk

CPU does computer's work.
- Memory: temp. storage of data, fast access
- Disk: large capacity, slow access
- Memory: reasonable capacity, fast access
- Cache: meager capacity, fast access
- Users write programs in human-readable language (for collaboration)
- Compiler translates into low-level instructions for CPU
  - CPU gets ordered instructions from memory
  - Location in memory stored in register on CPU
  - CPU executes instructions in number order
- Different compilers needed for different computers
- CPUs:
  - Made by Intel & AMD
  - Two types: x86-32 (32 bit), x86-64 (64 bit)
  - # bit: # of commands stored in ordered instruction list
- Multicore processors: multiple CPUs in one motherboard
- GPUs: graphical processing units
- Fast execution (e.g. gaming)
operating system: management structure
- kernel: handles I/O, memory allocation, order of execution, parallelization of processes, handling network communication
- ex Windows, Mac OS x, iOS, Linux ...

user → application → OS → hardware

Application Programming Interface (API): rules, definitions, protocols & tools easing communication between pieces of software

Linux: created for freely available computer programming environment
- can run programs for any purpose (no usage restrictions)
- can edit programs (open source)
- can redistribute without oversight

the shell: intermediates between user & OS, accepts commands, executes, returns results
- two types: Command Line Interface (CLI), Graphical User Interface (GUI)
  prompt: where you write commands